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Econometric Estimates of Import Price Elasticities for Canada

by

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ABSTRACT

This paper presents econometric estimates of disaggregated Canadian import price elasticities. This econometric analysis was undertaken as background to the Department of Finance's analysis of the Canada-U.S. Free Trade Agreement. Import price elasticities are important as they determine the sensitivity of imports to variations in relative prices. In order to get a coherent framework of analysis at a fairly disaggregated level, special care was taken in constructing the database which is derived from the Input-Output Tables. Estimates were obtained using four different import demand equations.

Import price elasticities were estimated for more than fifty commodities. The weighted-average elasticity for the manufacturing sector is -1.4 which is similar to the "consensus" value found in the empirical literature. This elasticity is substantially higher than the average calculated from more aggregate equations found in Canadian macroeconomic models. There are theoretical and empirical reasons to believe that the smaller elasticity found in macroeconomic models is due to their higher level of aggregation.

RÉSUMÉ

Le présent document traite de l'estimation, à un niveau désagrégé, d'élasticités de prix à l'importation au Canada. Cette analyse économétrique a servi de fond à l'étude du ministère des Finances sur l'Accord de libre-échange. Les élasticités de prix à l'importation sont importantes puisqu'elles déterminent la sensibilité des importations aux variations de prix relatifs. Afin d'obtenir un cadre d'analyse cohérent à un niveau désagrégé, une attention particulière a été apportée à la construction de la base de données qui est tirée des tableaux entrées-sorties. Les estimations ont été obtenues à partir de quatre équations de demande des importations.

Les élasticités de prix à l'importation ont été estimées pour plus de cinquante biens. L'élasticité pondérée du secteur manufacturier est de -1.4, ce qui la situe à un niveau près du consensus que l'on retrouve dans les études empiriques. Cette valeur est toutefois plus élevée que l'élasticité moyenne obtenue à partir des modèles macroéconomiques. Il y a lieu de croire, et ce pour des raisons à la fois théoriques et empiriques, que l'élasticité plus faible que l'on retrouve dans les grands modèles macroéconomiques résulte de leur niveau d'agrégation plus élevé.

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I. Introduction

The Department of Finance recently completed a major research project evaluating the overall economic impact of the Canada-U.S. Free Trade Agreement on the Canadian economy. The conclusions of this research were summarized in the document The Canada-U.S. Free Trade Agreement: An Economic Assessment. This study is one of a series of technical papers providing details of the Department's analysis. Other technical papers already published provided estimates of the barriers to trade existing between Canada and the United States and potential economies of scale in Canadian manufacturing industries. This paper reports on an econometric analysis undertaken in the Department to estimate the price elasticities of demand for Canadian imports.

Knowledge of trade price elasticities is critical in analyzing output and employment effects of trade liberalization, both in the aggregate and at the industry level, as they determine the sensitivity of imports to variations of relative prices. This is well illustrated by numerous studies on the impact of previous multilateral tariff reductions under the GATT. (See among others Balassa and Kreinin (1967) for the Kennedy Round, Deardoff and Stern (1981) and Whalley (1985) for the Tokyo Round.) Import and export price elasticities are among the key parameters of the General Equilibrium Trade model used by the Department of Finance to analyze the economic impact of the Canada-U.S. Free Trade Agreement.

Disaggregated trade price elasticities are notoriously difficult to find in the economic literature. A survey of empirical studies revealed that either the level of disaggregation was not sufficiently large for our purpose or that the sample period used was becoming outdated, thus limiting the applicability of these results to our analysis.[1]

This paper presents new estimates of Canadian import price elasticities for more than fifty commodities. In order to get a coherent framework of analysis at a disaggregated level, special care was taken when constructing the database to classify both production and foreign trade data using the same nomenclature. This procedure eliminates any measurement error which might originate from differences in commodity groupings between the dependent and independent variables. The database was derived from the Canadian Input-Output Tables.

The paper is organized as follows. Section II discusses different specifications of import demands. Section III deals with the database and the estimation results. Section IV provides a comparison of our estimated import price elasticities with those from other sources. Finally, Section V offers some concluding comments.

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1. See for example Stern et al. (1976). The Stern compendium is the usual source of disaggregated trade price elasticities.

II. Model specifications

In general equilibrium modelling, the decision to purchase a good is usually based on the Armington framework of analysis (Armington 1969) in which goods are differentiated by type and by place of origin. The place of origin is a proxy for the particular features of a product and consequently traded goods are imperfect substitutes with those of other foreign suppliers and of domestic producers. This assumption is consistent with the presence of intra-industry trade (or cross-hauling) and with the difficulty in finding empirical evidence supporting the law of one price.[1]

The Armington assumption also stipulates that consumers adopt a two-stage decision process. In the first stage, consumers allocate their budget over broad categories of goods (autos, clothing) based on their income and the relative prices of these goods. In the second stage, the distribution of purchases across product types in the same good category (eg. a German car vs a domestic car) is determined solely as a function of their relative prices. These estimates of price

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1. See Economic Council of Canada (1983) chapter 8 in the case of intra-industry trade; see also Kravis and Lypsey (1978) and Milone (1986) for tests of the law of one price. The law of one price requires that, once corrected for the exchange rate, the price of a good should be identical in all markets. One of the possible explanations for the observed price differential is that these goods are not judged to be identical by consumers.

elasticities are usually referred to as "Armington elasticities". Therefore, the decision to buy foreign products is a function of the amount of money allocated in the first stage for the good category and of the prices of foreign and domestic products in the second stage.

The key concept in this framework is the elasticity of substitution between products in the same good category appearing in the final demand equations. There are basically two ways to obtain elasticities that are compatible with the Armington framework. First, elasticities of substitution can be directly estimated. Second, own price elasticities can be estimated and elasticities of substitution can be derived indirectly. The convention in general equilibrium modelling has so far been to use import price elasticities already available in the literature and to derive elasticities of substitution.

Bearing these considerations in mind, we specified four import demand models to estimate price elasticities: (1) a simple substitution model; (2) a nominal market share model; (3) a traditional import demand model; and (4), the Buckler-Almon import model.

A. The simple substitution model

In this model, we estimate directly the elasticity of substitution defined as the percentage change of relative quantities induced by a percentage change in relative prices. The model can easily be derived from demand theory. Assume that the demand for the domestic (D) and foreign goods (M) are the following:

$$(1)\quad D = A^{\alpha_0}\, PM^{\alpha_1}\, PQ^{\alpha_2}\, Y^{\delta d}\, PT^{\gamma}$$

$$(2)\quad M = A^{\beta_0}\, PM^{\beta_1}\, PQ^{\beta_2}\, Y^{\delta m}\, PT^{\eta}$$

where

M = import volume

D = domestic sales of domestic producers in volume terms

PM = import price

PQ = domestic producer price

Y = money income

PT = general price index

Dividing (2) by (1) and expressing the result in terms of relative prices we get:

$$(3)\quad (M/D) = A^{\beta_0 - \alpha_0} \frac{PM^{\beta_1 - \alpha_1}}{PQ^{\alpha_2 - \beta_2}}\, Y^{\delta m - \delta d}\, PT^{\gamma - \eta}$$

Assuming for each of the domestic and foreign product that income elasticities and cross-price elasticities with respect to other goods are equal, that is $\delta m = \delta d$ and $\gamma = \eta$, which does not seem to be too restrictive since the products are quite similar although not perfectly identical, the equation is reduced to:

$$(4) \quad (M/D) = A^{\alpha_0 - \beta_0} \frac{PM^{\beta_1 - \alpha_1}}{PQ^{\alpha_2 - \beta_2}}$$

or expressed in logarithm form

$$(4A) \quad \log(M/D) = a_0 + a_1 * \log(PM/PQ)$$

with $a_1 < 0$.

The last equation imposes the constraint that the coefficients on PM and PQ must be the same or that the sum of direct and cross-price elasticities must be identical for each product.[1] This specification has been criticized on the basis that the latter constraint might be too restrictive (Leamer and Stern 1970, Chapter 3). In order to test for the validity of this restriction, they suggested that the following equation be estimated:

$$(4B) \quad \log(M/D) = a_0 + a_1 * \log(PM) + a_2 * \log(PQ)$$

with $a_1 < 0$, $a_2 > 0$

If $a_1 = -a_2$ specification (4A) would not be considered too restrictive.

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1. It is also worth pointing out that the elasticity of substitution between import and foreign goods is always larger than the own import price elasticity. This result comes simply from the fact that $\beta_1 < 0$ and $\alpha_1 > 0$ in equations (2) and (1). Therefore $\beta_1 - \alpha_1$ is larger than β_1, the own import price elasticity.

B. The nominal market share model

The specification of this model is straightforward and follows directly from the assumption that product demand functions in the Armington framework are linear and homogeneous. These restrictions imply that the import share of nominal domestic expenditures depends only on the relative prices of products (homotheticity).

Let the nominal spending on good i be:

(5) $E_i = PM_i * M_i + PQ_i * D_i$

where

E_i = nominal domestic expenditures on good category i

M_i = import volume of product i

D_i = domestic sales of domestic producers in constant dollars

PM_i, PQ_i = import and domestic producer price of product i respectively

Given the restrictions mentioned above[1], we have

$$\frac{M_i * PM_i}{E_i} = f(PM_i / PQ_i)$$

and therefore we can estimate.

$$(6) \quad \log((M_i * PM_i)/E_i) = \alpha_0 + \alpha_1 * \log(PM_i) + \alpha_2 * \log(PQ_i)$$

C. The conventional import demand functions

The third model is derived from conventional import demand functions that relate imports to relative prices and an activity variable and has the following specification:[2]

$$(7) \quad \log(M/DD) = \alpha_0 + \alpha_1 * \log(PM/PQ)$$

M = import volume

DD = domestic consumption in constant dollars

PM, PQ = import and domestic producer price.

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1. See Layard and Walters.

2. For a survey of these import demand specifications see Létourneau (1986).

In this case, the activity variable is defined as real expenditures on the good category and the elasticity of imports with respect to this variable is constrained to unity. The imposition of this constraint deserves some explanation. Preliminary tests with the unconstrained specification revealed that the activity elasticity was larger than unity in many cases, implying a growing market share irrespective of relative price changes. This result is usually attributed to the fact that prices do not always react quickly enough to reflect market forces. One way to correct for this weakness is to construct a cyclical activity and a trend activity variable. This would be particularly important during periods of excess demand which result in longer waiting time and larger unfilled orders, thus inciting customers to switch to foreign suppliers (Gregory 1971).

A cyclical pressure variable was included in the specification but failed to be statistically significant.[1] Therefore, it was decided to constrain the elasticity on real expenditures to unity. which is similar to estimating a constant dollar market share.

D. The Buckler-Almon model

The fourth model is also based on conventional import demand equations. However, the formulation imposes a constant relative price

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1. Moreover the standard specification was plagued with a strong multi-collinearity problem.

elasticity while allowing the activity elasticity of demand to vary. The specification, used in the University of Maryland Lift model, is as follows:

$$(8) \quad M = (\alpha_0 + \alpha_1 * DD)\ P^{\alpha_2}$$

M = import volume

DD = domestic consumption in constant dollars.

P = ratio of import price to domestic producer price.

This model requires a non-linear estimation technique since the parameters αo and α1 cannot be linearized. The relative import price elasticity is given by α2.

Finally, it should be mentioned that an obvious omitted variable in all these models is the tariff. This omission is not unique to our study: tariff rates are rarely included in empirical estimates of disaggregated import equations. Although time series of tariff rates can be calculated by dividing duties collected by the value of imports, the resulting data exhibit significant year-to-year variance caused by changes in the composition of imports rather than changes in tariff rates.

III. Estimation

A) Database

The data are taken from the Input-Output and Canadian Econometric Model for Structural Analysis[1] (CEMSA) databases and cover the period 1961 to 1981. Nominal series are taken directly from the Input-Output Tables. The import price series were calculated from the CEMSA database for the 1961-1970 period and from the Input-Output database for the 1971-1981 period. It was judged necessary to use the CEMSA database for the earlier period since import prices in the I/O database were calculated making extensive use of domestic prices as proxies for import prices prior to 1971. The methodology used in constructing the CEMSA import prices gives similar results to that used in the I/O database for the 1971-76 period, so using two data sources is unlikely to cause problems. Import prices in the CEMSA database for over 100 commodities were calculated using either unit values from external trade data or specification prices for U.S. products, often taken from producer price indexes.

The Input-Output database in constant dollars is not available from 1961 to 1981 on a consistent basis. The volume series for 1961 to 1970 are available in 1961 constant dollars while the data from 1971 to

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1. Statistics Canada, The Input-Output Structure of the Canadian Economy, 15-510 and 15-511 and Caldwell (1982).

1981 have a 1971 base. The Input-Output Division at Statistics Canada made the 1971 volume series available to us on a 1961 basis, which enabled us to calculate a consistent time series over the entire period by applying a multiplicative adjustment factor to the 1961-1970 constant dollar data. This technique maintains the growth rates in the original data.

B) Empirical Results

The commodity import classification used in this study includes 70 goods. All services and some goods for which imports are negligible are excluded. The commodity classification is presented in Appendix 1. With the exception of model 4, all estimations were done using OLS with annual data covering the 1961-1981 period; the estimation of model 4 was done with the non-linear estimation package in Troll over the same sample period. Disaggregated results for all models are reported in Appendix 3.

Table 1 summarizes the overall performance of each model. Models 3 and 1 are the most successful in the sense that they provide price elasticities having the theoretically correct sign for 54 and 47 out of 70 commodities respectively. The two other models, the Buckler-Almon and the nominal market share models, provide correctly-signed estimates for 31 and 30 commodities respectively.

Table 1

Global Estimation Results

Model	Number of Equations for Which Price Coefficients Were: Negatively Signed	Negatively Signed and Statistically[1] Significant
Conventional (3)	54	42
Substitution (1)	47	39
Buckler-Almon (4)	31	26
Nominal Share (2)	30	23

1. 5 per cent level (one tail)

The quality of estimated price elasticities follows the same ranking. In the conventional import equations, 42 out of the 54 correctly-signed price coefficients are significantly different from zero at the 5 per cent level (one tail). In the case of model 1, the corresponding number is 39 while statistically significant price coefficients were obtained for 26 and 23 commodities in models 4 and 2 respectively.

The existence of intrafirm trade, which accounts for a significant portion of Canadian imports in some cases (MacCharles 1985), could be a factor in the failure to obtain correctly-signed price coefficients for some commodities as it affects the response of import volumes to price changes (Goldbrough 1981). This issue is particularly

evident for automobiles and trucks.[1] In the above models, trade is explained by activity levels and movements in relative prices; institutional factors such as intrafirm trade are not taken into consideration.

Goldbrough has estimated separate equations of US manufacturing imports for intrafirm and conventional trade flows: he obtained price elasticities that had the wrong sign for intrafirm trade but had the theoretically expected sign in the case of conventional trade flows. The apparent lack of price responsiveness for intrafirm trade might be explained by the fact that integrated plants produce goods tailored to the firm's particular manufacturing and distribution needs. These goods have fewer close substitutes than the more standardized alternatives purchased on the open market. Another possible explanation is that prices established for trade between related firms may differ from prices that would prevail in transactions between unrelated firms.

Some general comments can be made about our estimation results. First, testing the a priori constraint imposed on prices in the substitution model indicated that, for the large majority of categories, the coefficients on import and domestic producer prices are

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1. There are other factors to consider in the case of automobiles and trucks: import prices are incorrectly derived from domestic prices and the Auto Pact requirements influence trade in motor vehicles.

statistically identical. That is, imposing the constraint that the coefficients on domestic and foreign prices be the same does not appear to be too restrictive. Second, different lag structures were tested on the various specifications and for most of the categories, the adjustment is completed within a year. This last result is consistent with other empirical studies which have found short lags in the Canadian response of imports to changes in relative prices.[1] Finally, we note that the use of a lagged dependent variable gave slightly better results than a distributed lag on relative prices.

Table 2 reports the statistical significance of estimated price coefficients for each model. Although statistically significant price coefficients are obtained in all four models for only 12 commodities, at least two statistically significant price coefficients were obtained for 42 commodities and at least one of the four models provides a significant price coefficient for 48 commodities.

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1. In their recent survey of the literature, Goldstein and Kahn (1985) found a relatively short lag response for both export and import equations although the issue would need, in their opinion, additional empirical evidence. In this regard, our results are also compatible with those of the Department of Finance Canadian Economic and Fiscal Model (CEFM) and of the Bank of Canada's RDXF. See also Spencer (1984). However, the use of annual data limits the importance of dynamic adjustment.

TABLE 2

Statistical Significance of Price Coefficients

		Model 1	Model 2	Model 3	Model 4
1	Grain	*	*	*	*
2	Live Animals	*	*	*	*
3	Other Agricultural Products	*	-	*	-
4	Fishing, Hunting Trapping	-	-	-	-
5	Fish Products	-	*	*	-
6	Feeds	-	-	-	-
7	Tobacco	*	-	*	V
8	Cigarettes	*	-	*	*
9	Meat Products	*	*	*	*
10	Dairy Products	*	*	*	*
11	Fruit and Vegetables	*	-	*	*
12	Flour, Wheat, Other Cereals	-	-	V	*
13	Breakfast cereals and Baking Prod.	*	*	*	-
14	Sugar	*	V	*	*
15	Soft Drinks	-	-	-	V
16	Alcoholic Beverages	*	*	*	*
17	Misc Food Products	*	-	*	*
18	Other Forestry Products	*	V	*	-
19	Veneer and Plywood	*	*	*	*
20	Pulp	*	V	*	*
21	Newsprint and Other Products	*	V	*	*
22	Converted Papers	*	*	*	-
23	Coal	*	-	*	*
24	Crude Oil	*	-	*	-
25	Gasoline	-	-	-	-
26	Fuel Oil	*	-	*	-
27	Other Petroleum and Coal Products	-	-	V	-
28	Soaps and Toilet Preparations	*	*	*	-
29	Paints and Related Products	-	-	V	-
30	Pharmaceuticals	-	-	V	-
31	Chemicals	V	*	V	-
32	Fertilizer	*	V	*	*
33	Rubber and Plastic Products	*	*	*	*
34	Leather and Leather Products	-	-	-	*
35	Footwear	-	-	-	-
36	Yarns of Man-Made Fibres	*	*	*	*
37	Fabrics	*	-	*	*
38	Carpeting	-	-	V	-
39	Textiles	-	-	-	-
40	Clothing	*	-	*	-

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* Different from zero at 5% (one tail)
V not different from zero at 5% (one tail)
\- estimates judged unsatisfactory because of wrong signs or no price response.

		Model 1	Model 2	Model 3	Model 4
41	Printing and Publishing	V	-	V	-
42	Furniture	*	*	*	*
43	Recreational and Misc. Consumer Goods	-	-	-	-
44	Cement and Concrete Products	*	*	*	-
45	Glass Products	*	-	*	-
46	Other Non-Metallic Products	*	-	*	*
47	Iron Ore Concentrates	V	*	*	*
48	Other Ores	-	-	V	-
49	Iron, Steel Tubes and Castings	V	*	V	-
50	Aluminum Products	*	*	*	*
51	Copper and Alloy Products	-	*	-	-
52	Non-Ferrous Metal Products	-	-	-	-
53	Non-Metallic Minerals	-	-	V	V
54	Fabricated Structural Metal Prod.	V	-	V	*
55	Wire Products	*	-	*	-
56	Boilers Tanks and Plates	V	V	V	-
57	Hardware and Tools	-	-	-	-
58	Heating and Misc. Metal Products	*	*	*	*
59	Industrial Machinery and Equipment	V	-	-	-
60	Tires and Tubes	*	*	*	*
61	Autos	-	-	-	-
62	Trucks and Other Vehicles	-	-	-	-
63	Motor Vehicle Parts and Engines	*	*	*	-
64	Misc. Vehicle Manufactures	-	-	-	-
65	Appliances	*	-	*	V
66	Radio and TV	V	*	*	-
67	Communication Equipment	*	V	*	-
68	Electric Wire and Cable	*	-	*	-
69	Misc. Electrical Products	-	-	-	-
70	Scientific Equipment	*	-	*	V

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* Different from zero at 5% (one tail)
V not different from zero at 5% (one tail)
\- estimates judged unsatisfactory because of wrong signs or no price response.

Table 3 presents the estimates of import price elasticities. The Armington formula has been used to transform elasticities of substitution into import price elasticities for model 1.[1] The selection of the "best estimate" is based on the statistical significance of the estimated price coefficients of each category. In some cases, it is a simple average of the four models; in others, estimates judged to be inferior were discarded.

Our price elasticity estimates range from almost zero in the case of other petroleum and coal products to -7.3 in the case of copper and alloy products. The weighted average import price elasticity stands at -1.4.

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1. As mentioned in the introduction elasticity of substitution can be calculated from own price elasticity and vice-versa using the following Armington formula:

   $\alpha = -(\sigma - S*\sigma + S*n)$ where

   - α = own price elasticity
   - σ = elasticity of substitution
   - S = nominal import market share
   - n = own price elasticity for the good category. This is set to unity in our calculations.

   Conversely,

   $\sigma = (-\alpha - S)/(1-S)$

   See Armington (1969) and Branson (1972).

   "Best estimate" elasticities of substitution are presented in Appendix 2.

TABLE 3

OWN PRICE ELASTICITY

		Model 1	Model 2	Model 3	Model 4	Best Estimate*
1	Grain	-1.52	-0.71	-1.34	-0.52	-1.02 (A)
2	Live Animals	-4.80	-3.87	-4.85	-5.48	-4.80 (A)
3	Other Agricultural Products			-0.70		-0.70
4	Fishing, Hunting Trapping					
5	Fish Products		-1.23	-2.22		-2.22
6	Feeds					
7	Tobacco			-0.67	-1.17	-0.92 (A)
8	Cigarettes			-0.52	-0.56	-0.54 (A)
9	Meat Products	-1.92	-0.98	-1.87	-1.66	-1.61 (A)
10	Dairy Products	-1.53	-1.81	-1.67	-3.60	-1.67
11	Fruit and Vegetables	-1.97		-1.80	-0.25	-1.89
12	Flour, Wheat, Other Cereals			-0.45	-0.71	-0.58 (A)
13	Breakfast cereals and Baking Prod.	-1.11	-0.86	-1.11		-1.03 (A)
14	Sugar	-1.42	-0.34	-1.20	-0.91	-1.18
15	Soft Drinks				-2.13	-2.13
16	Alcoholic Beverages	-2.84	-1.10	-2.95	-1.17	-2.01 (A)
17	Misc. Food Products	-1.05		-0.92	-0.60	-0.99
18	Other Forestry Products	-1.15	-0.79	-1.11		-1.13
19	Veneer and Plywood	-1.53	-0.49	-1.44	-2.05	-1.49
20	Pulp	-3.58	-2.72	-3.55	-5.84	-3.28
21	Newsprint and Other Products	-2.97	-1.18	-3.00	-2.94	-2.97
22	Converted Papers	-1.60	-0.56	-1.57		-1.59
23	Coal	-1.02		-0.18	-0.36	-0.52 (A)
24	Crude Oil	-1.29		-0.93		-1.11 (A)
25	Gasoline					
26	Fuel Oil	-2.12		-2.02		-2.07 (A)
27	Other Petroleum and Coal Products			-0.05		-0.05
28	Soaps and Toilet Preparations	-5.11	-1.57	-5.26		-5.19
29	Paints and Related Products			-1.29		-1.29
30	Pharmaceuticals			-3.82		-3.82

* The best estimate is based on the statistical significance of estimated price elasticities. In some cases, it is a simple average of the four models, which are indicated with an (A).

		Model 1	Model 2	Model 3	Model 4	Best Estimate*
31	Chemicals		-1.44	-0.50		-1.44
32	Fertilizer	-1.15	-0.90	-1.02	-1.75	-1.20 (A)
33	Rubber and Plastic Products	-1.89	-0.76	-1.67	-1.48	-1.68
34	Leather and Leather Products				-2.98	-2.98
35	Footwear					
36	Yarns of Man-Made Fibres	-1.60	-1.76	-1.38	-1.22	-1.49 (A)
37	Fabrics	-1.30		-0.99	-0.74	-1.01 (A)
38	Carpeting			-0.39		-0.39
39	Textiles					
40	Clothing	-1.57		-1.54		-1.56 (A)
41	Printing and Publishing	-1.78		-1.60		-1.69 (A)
42	Furniture	-2.94	-2.00	-2.94	-2.89	-2.92
43	Recreational and Misc. Consumers Goods					
44	Cement and Concrete Products	-4.73	-3.52	-4.81		-4.35 (A)
45	Glass Products			-0.67		-0.67
46	Other Non-Metallic Products			-0.71	-0.59	-0.65 (A)
47	Iron Ore Concentrates	-2.43	-6.34	-5.58	-7.21	-6.38
48	Other Ores			-0.23		-0.23
49	Iron, Steel Tubes and Castings	-1.14	-1.94	-1.02		-1.37 (A)
50	Aluminum Products	-1.10	-0.77	-0.97	-1.04	-1.04
51	Copper and Alloy Products		-7.27			-7.27
52	Non-Ferrous Metal Products					
53	Non-Metallic Minerals			-0.27	-0.59	-0.43 (A)
54	Fabricated Structural Metal Products	-1.15		-1.07	-1.66	-1.29 (A)
55	Wire Products			-0.43		-0.43
56	Boilers Tanks and Plates	-1.48	-1.22	-1.42		-1.37 (A)
57	Hardware and Tools					
58	Heating and Misc. Metal Products		-1.16	-1.05	-2.14	-1.45 (A)
59	Industrial Machinery and Equipment					
60	Tires and Tubes	-6.43	-7.27	-6.83	-2.68	-6.84

* The best estimate is based on the statistical significance of estimated price elasticities. In some cases, it is a simple average of the four models, which are indicated with an (A).

		Model 1	Model 2	Model 3	Model 4	Best Estimate*
61	Autos					
62	Trucks and Other Vehicles					
63	Motor Vehicle Parts and Engines	-1.22	-1.06	-0.90		-1.06 (A)
64	Misc. Vehicle Manufactures					
65	Appliances	-1.77		-1.52	-0.77	-1.65
66	Radio and TV	-1.20	-1.27	-1.52		-1.33 (A)
67	Communication Equipment	-1.79	-0.69	-1.54		-1.67
68	Electric Wire and Cable			-0.88		-0.88
69	Misc. Electrical Products					
70	Scientific Equipment	-1.22		-0.77	-0.49	-1.00

* The best estimate is based on the statistical significance of estimated price elasticities. In some cases, it is a simple average of the four models, which are indicated with an (A).

IV. Comparison of Disaggregated Import Price Elasticities

In this section we compare our import price elasticities with those reported in other studies. As mentioned in the introduction, disaggregated estimates are difficult to find in the empirical literature.[1] In order to facilitate the comparison, our estimates were aggregated to the two-digit manufacturing industry classification. It is important to note that, as interesting as it might be, this exercise is severely limited by the following factors: first, the level of aggregation varies across estimates and in some cases gaps had to be filled; second, the sample period and the data frequency are also different; third, our estimates were originally derived on a commodity basis and then aggregated on an industry classification based on major industry products.

The estimates are presented in Table 4. The CEMSA database covers the 1961-1976 period while our sample extends to 1981; both studies use annual data. The 20 estimates for manufacturing are calculated from about 90 CEMSA commodities and from over 50 commodities in the case of our study.

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1. The popularity of the Stern, Francis, Schumacker compendium, even after more than ten years of its publication, confirms this point. The Stern et al. compendium is used by Harris and Cox (1983) and by Whalley (1985) for his multicountry model and his regional model of the Canadian economy (Whalley and Trela (1986) p. 150). It is also used in the IMF MERM model (Artus and McGuirk (1981) p. 293) as well as in the Michigan model (Deardoff and Stern (1981) p. 134).

The estimates are, in general, relatively similar except for certain isolated cases like rubber and plastics and petroleum and coal products. On an aggregate basis, our estimate is somewhat larger: -1.4 compared to -1.2 for CEMSA. This result is surprising given the higher level of aggregation of our estimation since other evidence shows that disaggregation tends to produce higher estimates even when we take into consideration the presence of intrafirm trade.[1] This aggregation bias appears to be more than offset by extending the sample period to 1981. A simple test using an aggregate equation indicates that price elasticities based on the 1961-1976 period are somewhat smaller, but not statistically different, than those including more recent data.

Our estimation for total manufacturing (-1.4) is also well within range of the "consensus". In their survey, Goldstein and Kahn (1985) conclude that price elasticities of imports of manufactured goods are in general slightly over -1.0 for industrial countries (the median value of their survey is -1.3) and are larger than those of non-manufactured goods. In their compendium, Stern et al. present an estimate of -2.06 for the Canadian import price elasticity of manufactured goods. This estimate is an average calculated from aggregate equations of the manufacturing sector (SITC 5 - 9)[2] having a sample period covering the fifties.

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1. The nature of the aggregation bias is discussed below.

2. The Standard International Trade Classification (SITC) for category groups 5 to 9 includes chemicals, manufactured goods classified chiefly by material, machinery and transport equipment, miscellaneous manufactured articles and commodities and transactions not classified elsewhere.

Table 4

Comparison of Disaggregated Import Price Elasticities for Canada

		CEMSA	This Study	SFS
1.	Food and Beverage	-1.40	-1.57	-0.87
2.	Tobacco	-0.58	-0.62	-
3.	Rubber and Plastics	-1.01	-3.44	-
4.	Leather	-1.13	-1.73	-
5.	Textiles	-1.83	-1.23	-
6.	Knitting Mills	-1.02	-1.01	-
7.	Clothing	-0.48	-1.56	-
8.	Wood	-1.39	-1.26	-
9.	Furniture and Fixtures	-2.22	-2.92	-
10.	Paper and Allied Products	-1.85	-2.39	-
11.	Printing and Publishing	-0.88	-1.69	-
12.	Primary Metals	-1.11	-1.79	-
13.	Metal Fabricating	-0.86	-1.04	-
14.	Machinery	-0.61	-0.80	-
15.	Transportation Equipment	-1.62	-1.24	-3.66
16.	Electrical Products	-0.94	-1.46	-
17.	Non-Metallic Mineral Products	-0.67	-0.96	-
18.	Petroleum and Coal Products	-3.58	-2.07	-0.52
19.	Chemicals and Chemical Product	-1.05	-2.03	-
20.	Miscellaneous Manufacturing	-0.51	-1.00	-
	Total Manufacturing	-1.18	-1.40	-
	SITC 5 - 9 (Manufacturing)	-	-	-2.06

The most recent evidence of price elasticities of import volumes for Canada can be found, although at a relatively aggregate level, in macroeconomic models. A survey of some of these models (CEFM, RDXF, SAM, TIM) indicates a -0.7 price elasticity of import volumes for Canada on average.[1] In a recent reestimation of its INTERLINK model, the OECD presents a preliminary estimate of -1.6 for the Canadian price elasticity of imports of manufactured goods. This estimate, calculated from a single equation for the manufacturing sector, appears large considering the fairly high level of aggregation; their former estimate stood at -1.1. In summary, our estimates for disaggregated import price elasticities are generally similar to other studies at the disaggregated level but the aggregate price response of imports is quite different from that found in macroeconomic models.

The generally smaller magnitude of aggregate import price elasticities stresses the importance of the aggregation bias in the estimation of import price elasticities. This bias, first mentioned by Orcutt (1950), occurs because, in aggregate equations, goods with relatively low price elasticities can show the largest variations in prices and therefore exert a dominant effect on the aggregate price elasticity.

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1. CEFM is a macromodel used at the Department of Finance for forecasting and policy analyses. RDXF and SAM have been both developed at the Bank of Canada. The TIM model is from Informetrica Ltd. The number of import equations range from one in SAM to more than thirty in TIM, although not all are stochastic in the latter model.

Roussland and Parker (1981) introduced an additional explanation for the aggregation bias. To the extent that imported goods and imported intermediate inputs used in the production of their domestic substitutes are in the same classification, output effects will reduce the net change in imports that accompany relative price changes for this aggregate, and hence will reduce the estimated price elasticity.

In order to measure the magnitude of the aggregation bias we estimated a single import equation using the same functional form and database as in the disaggregated analysis. We obtained a -0.6 import price elasticity. Moreover, we found a -0.9 average import price elasticity from a median aggregation of 15 categories. These results suggest that working with even less aggregated data could result in still higher estimated price elasticities.

This aggregation problem is one of several biases that have led researchers to conclude that standard empirical estimates of import price elasticities are biased downward and generally centered around unity.[1] The pioneering work in this regard is by Orcutt (1950). In addition to the aggregation bias discussed above, Orcutt pointed out a possible simultaneity bias between import volumes and prices: large increases in import quantities might generate higher import prices owing

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1. See Whalley (1985) and Harris (1983). For more details, see Leamer and Stern (1970), Magee (1975), Mansur (1982), Goldstein and Kahn (1985) and Létourneau (1986).

to supply constraints in the foreign country. This bias should not be important for Canadian imports since it is often argued that the supply of imported goods is effectively infinite at the given world price for such a small country (Applebaum and Kohli (1979)).

Orcutt also argued that the value of price elasticities might be positively related to the magnitude of the price changes. This effect, referred to as the quantum effect, simply states that price changes might have to exceed a threshold in order to break consumer inertia against changing suppliers. However, recent empirical evidence (Goldstein and Kahn (1976)) does not support this assumption.

Kemp (1962) demonstrated the presence of a bias towards unity in estimated import price elasticities if measurement error consistently occurs in the calculation of the import price index used to deflate import values. The importance of this last point was not assessed in this study.

V. Conclusion

In this paper, we present estimates of disaggregated price elasticities of import demands for primary and manufactured goods. Special care was taken in constructing the database in order to establish a coherent framework of analysis. Estimated import price elasticities are presented for more than fifty out of the initial seventy categories.

Our weighted average price elasticity for total manufacturing is -1.4. This is very close to the "consensus" value of -1.3 found in the Goldstein and Kahn (1985) survey, but substantially higher than the -0.7 average calculated from the more aggregate equations found in Canadian macroeconomic models. There are theoretical and empirical reasons to believe that the smaller elasticity found in macroeconomic models is due to their higher level of aggregation. These considerations also suggest that estimating import demand equations for even more commodity categories than was undertaken in this study would result in higher relative price elasticities.

Appendix 1

Commodity Aggregation and the Estimation of Import Price Elasticities

The aggregation of import commodities in this study is based on the Input-Output "L" aggregation; the correspondence with the "L" aggregation is presented in the following Table. All service industries are excluded from this aggregation exercise. Moreover, aircraft, natural gas, railroad rolling stock and shipbuilding and repairs are also excluded either because their imports are negligible and/or because the bulky and erratic nature of their trade makes it impossible to derive any significant econometric results.

Commodity Aggregation for the Estimation of Import Equations

	This Study	Input/Output "L" Aggregation
Grain	1	7, 8
Live Animals	2	1-5
Other Agricultural Products	3	9-23
Fishing, Hunting and Trapping	4	29, 30
Fish Products	5	75
Feeds	6	85-89, 100, 103, 118
Tobacco Processed Un-manufactured	7	121
Cigarettes & Tobacco Manufacturing	8	122, 123
Meat Products	9	52-66
Dairy Products	10	67-74
Fruits & Vegetable Preparations	11	76-84
Flour, Wheat - Other Cereals	12	90, 91
Breakfast Cereal & Baking Products	13	92-95
Sugar	14	101
Soft Drinks	15	114, 115
Alcoholic Beverages	16	116, 119, 120
Misc. Food Products	17	96-99, 102, 104, 106-113
Other Forestry Products	18	24-28, 190, 191, 192-194, 196-203
Veneer and Plywood	19	195
Pulp	20	209
Newsprint and Other Papers	21	210-216
Converted Papers	22	217-227
Coal	23	37
Crude Oil	24	38
Gasoline	25	394, 395
Fuel Oil	26	396

	This Study	Input/Output "L" Aggregation
Other Petroleum and Coal Products	27	245, 397-402, 548
Soaps and Toilet Preparations	28	413, 415
Paints and Related Products	29	409
Pharmaceuticals	30	408
Chemicals Products	31	105, 117, 404-407, 410-414, 416-496
Fertilizer	32	403
Rubber and Plastic Products	33	124, 129-138
Leather and Leather Products	34	139, 141-144
Leather Footwear	35	140
Yarns of Man-made Fibres	36	145, 146, 151, 154-157, 161, 164
Fabrics	37	147, 148, 152, 158, 159, 167, 168, 181, 182
Carpeting	38	169, 170
Textile Products	39	149, 150, 153, 160, 162, 163, 165, 166, 171-179
Clothing and Knitted Wear	40	180, 183-189
Printing and Publishing	41	228-234
Furnitures	42	204-208
Recreational and Misc. Cons. Goods	43	504-521
Cement and Concrete Products	44	376, 377-379
Glass Products	45	390-392
Other Non-Metallic Products	46	376, 380-389, 393
Iron Ores of Concentrates	47	34

	This Study	Input/Output "L" Aggregation
Other Ores	48	32, 33, 35, 36
Iron, Steel Tubes and Castings	49	235-244, 247-252
Aluminum Products	50	257, 264
Copper and Copper Alloy Products	51	254, 265, 266
Non-Ferrous Metal Products	52	246, 253, 255, 256, 258-263, 267-271
Non-Metallic Minerals	53	41-50
Fabricated Structural Metal Products	54	276-279
Wire Products	55	287-291
Machinery, Boilers, Tanks & Plates	56	272-275, 300
Hardware & Tools	57	292-298
Heating and Misc. Metal Products	58	280-286, 301-313
Industrial Machinery and Equipment	59	314-329
Tires and Tubes	60	125-128
Autos	61	334
Trucks and Other Vehicles	62	335-339
Motor Vehicle Parts and Engines	63	340-344
Misc. Vehicle Manufactures	64	351, 352
Appliances	65	299, 353-356
Radio & TV	66	357
Communication Equipment	67	358-368
Electric Wire & Cable	68	370, 371
Misc. Electrical Products	69	369, 372-374
Scientific Equipment	70	497-503

Appendix 2

In this appendix, we present Canadian import price elasticities of substitution calculated using the Armington formula, except for model 1 estimates which were estimated directly. (See footnote 1 on page 18.) In certain cases both series of own price and substitution elasticities are necessary in general equilibrium modelling.

ELASTICITY OF SUBSTITUTION

		Model 1	Model 2	Model 3	Model 4	Best Estimate*
1	Grain	1.58	-	1.38		1.48 (A)
2	Live Animals	4.94	3.98	4.99	5.65	4.89 (A)
3	Other Agricultural Products	0.86				0.86
4	Fishing, Hunting Trapping					
5	Fish Products		1.53	3.80		3.80
6	Feeds					
7	Tobacco	0.71			1.18	0.71
8	Cigarettes	0.52				0.52
9	Meat Products	1.97		1.91	1.69	1.86 (A)
10	Dairy Products	1.54	1.83	1.69	3.66	1.69
11	Fruit and Vegetables	2.35		2.11		2.23 (A)
12	Flour, Wheat, Other Cereals					
13	Breakfast cereals and Baking Prod.	1.11		1.11		1.11 (A)
14	Sugar	1.42		1.21		1.32 (A)
15	Soft Drinks				2.15	2.15
16	Alcoholic Beverages	3.33	1.13	3.47	1.22	2.29 (A)
17	Misc Food Products	1.06				1.06
18	Other Forestry Products	1.16		1.12		1.14 (A)
19	Veneer and Plywood	1.65		1.54	2.30	1.60
20	Pulp	3.94	2.96	3.90	6.51	3.60
21	Newsprint and Other Products	3.30	1.21	3.33	3.29	3.31
22	Converted Papers	1.70		1.66		1.68 (A)
23	Coal	1.15				1.15
24	Crude Oil	1.57				1.57
25	Gasoline					
26	Fuel Oil	2.22		2.11		2.15 (A)
27	Other Petroleum and Coal Products					
28	Soaps and Toilet Preparations	5.53	1.63	5.69		5.60
29	Paints and Related Products			1.33		1.33
30	Pharmaceuticals			4.85		4.85

* The best estimate is based on the statistical significance of estimated price elasticities. In some cases, it is a simple average of the four models, which are indicated with an (A).

		Model 1	Model 2	Model 3	Model 4	Best Estimate*
31	Chemicals	0.70	1.65			1.65
32	Fertilizer	1.20		1.03	2.02	1.42 (A)
33	Rubber and Plastic Products	2.25		1.94	1.68	1.96 (A)
34	Leather and Leather Products				4.37	4.37
35	Footwear					
36	Yarns of Man-Made Fibres	1.95	2.20	1.60	1.35	1.78 (A)
37	Fabrics	1.50				1.50
38	Carpeting					
39	Textiles					
40	Clothing	1.73		1.69		1.71 (A)
41	Printing and Publishing	1.94		1.73		1.84 (A)
42	Furniture	3.24	2.16	3.25	3.19	3.23
43	Recreational and Misc. Consumers Goods					
44	Cement and Concrete Products	4.84	3.59	4.92		4.45 (A)
45	Glass Products	0.93				0.93
46	Other Non-Metallic Products	0.97				0.97
47	Iron Ore Concentrates	4.54	14.25	12.36	16.41	11.90
48	Other Ores					
49	Iron, Steel Tubes and Castings	1.18	2.25	1.03		1.49 (A)
50	Aluminum Products	1.13			1.05	1.10 (A)
51	Copper and Alloy Products		8.69			8.69
52	Non-Ferrous Metal Products					
53	Non-Metallic Minerals					
54	Fabricated Structural Metal Products	1.17		1.08	1.73	1.33 (A)
55	Wire Products	0.49				0.49
56	Boilers Tanks and Plates	1.56	1.26	1.49		1.44 (A)
57	Hardware and Tools					
58	Heating and Misc. Metal Products	0.92	1.20	1.06	2.40	1.40 (A)
59	Industrial Machinery and Equipment	0.59				0.59
60	Tires and Tubes	9.07	10.32	9.66	3.50	9.68

* The best estimate is based on the statistical significance of estimated price elasticities. In some cases, it is a simple average of the four models, which are indicated with an (A).

		Model 1	Model 2	Model 3	Model 4	Best Estimate*
61	Autos					
62	Trucks and Other Vehicles					
63	Motor Vehicle Parts and Engines	2.62	1.44			2.03 (A)
64	Misc. Vehicle Manufactures					
65	Appliances	2.25		1.84		2.05 (A)
66	Radio and TV	2.17	2.55	3.99		2.90 (A)
67	Communication Equipment	2.51		2.04		2.28 (A)
68	Electric Wire and Cable	0.91				0.91
69	Misc. Electrical Products					
70	Scientific Equipment	1.85				1.85

* The best estimate is based on the statistical significance of estimated price elasticities. In some cases, it is a simple average of the four models, which are indicated with an (A).

Appendix 3

This appendix presents disaggregated estimation results for the four model specifications. In model 1, price elasticities were calculated from the estimated substitution elasticities using the Armington formula. (See footnote 1 on page 18.) In the other models, substitution elasticities are derived from estimated price elasticities using the same formula.

The four model specifications are as follows:

Model 1: Simple substitution

$$\log (M/D) = a_0 + a_1 * \log (PM/PQ)$$

Model 2: Nominal market share

$$\log (MC/DDC) = b_0 + b_1 * \log (PM/PQ)$$

Model 3: Conventional Import demand

$$\log (M/DD) = c_0 + c_1 * \log (PM/PQ)$$

Model 4: Buckler-Almon

$$\log (M) = (\alpha_0 + \alpha_1 * DD)\ P^{\alpha}2$$

where

M = import volume

D = domestic sale of domestic producers in constant dollars

P = import price over domestic producer price

PM = import price

PQ = domestic producer price

MC = import in current dollars

DDC = apparent domestic consumption in current dollars: production imports - exports - reexports

DD = apparent domestic consumption in constant dollars.

In some equations, dummy variables were included in order to take account of special factors. Moreover a time trend was added to take account of non-price factors and of the failure to get meaningful tariff rates.

Preliminary Estimation Results for the Simple Substitution Model

	(1) GRAIN	(2) LIVE ANIMALS	(3) OTHER AGRICULTURAL PRODUCTS	(4) FISHING HUNTING TRAPPING	(5) FISH PRODUCTS	(6) FEEDS	(7) TOBACCO	(8) CIGARETTES
Elasticity of Substitution	-1.58 (-5.97)	-4.94 (-3.49)	-0.86 (-3.03)				-0.71 (-2.33)	-0.52 (-3.00)
Lagged Dependent Variable								
TIME		0.05 (2.40)						0.04 (6.55)
RHO		0.45 (2.31)	0.45 (1.93)					
$\overline{R2}$	0.63	0.69	0.38				0.18	0.89
DW	1.33	1.73	1.99				2.06	1.68
Share of 1981 Imports (%)	0.3	0.3	1.6	0.2	0.4	0.3	0.01	0.04
Market Share of Imports (1981, %)	10.4	3.6	20.4	20.5	56.5	6.8	3.6	3.0
Own Price Elasticity	-1.52	-4.80	c				c	c

a) "T" statistics are in parentheses.
b) The estimation was done with OLS over the 1961-1981 period using annual data.
c) Undefined (elasticity of substitution is less than one).

	(9) MEAT PRODUCTS	(10) DAIRY PRODUCTS	(11) FRUITS AND VEGETABLES	(12) FLOUR, WHEAT AND OTHER CEREALS	(13) BREAKFAST CEREALS AND BAKING PRODUCTS	(14) SUGAR	(15) SOFT DRINKS	(16) ALCOHOLIC BEVERAGES
Elasticity of Subsitition	-1.97 (-7.58)	-1.54 (-1.95)	SR = -0.47 (-4.32) LR = -2.35		SR = -0.83 (-2.70) LR = -1.11	-1.42 (-3.74)		-3.33 (-8.02)
Lagged Dependent Variable			0.80 (11.93)		0.25 (1.86)			
TIME	0.011 (2.11)				SR = 0.03 (4.07) LR = 0.04			
RHO		0.75 (5.82)				0.5 (2.54)		
$\overline{R2}$	0.80	0.76	0.95		0.95	0.42		0.76
DW	1.73	1.75	2.45		1.67	1.50		1.79
Share of 1981 Imports (%)	0.6	0.1	0.9	0.03	0.09	0	0	0.6
Market Share of Imports (1981, %)	4.8	2.3	27.8	4.6	3.3	0.9	1.7	21.1
Own Price Elasticity	-1.92	-1.53	-1.97		-1.11	-1.42		-2.84

	(17) MISC FOOD PRODUCTS	(18) OTHER FORESTRY PRODUCTS	(19) VENEER AND PLYWOOD	(20) PULP	(21) NEWSPRINT AND OTHER PRODUCTS	(22) CONVERTED PAPERS	(23) COAL	(24) CRUDE OIL
Elasticity of Substitution	SR = -0.38 (-2.06) LR = -1.06	-1.16 (-1.88)	-1.65 (-6.13)	-3.94 (-1.74)	-3.30 (-3.78)	-1.70 (-6.08)	-1.15 (-3.18)	SR = -0.47 (-3.35) LR = -1.57
Lagged Dependent Variable	0.64 (3.91)							0.70 (5.18)
TIME	SR = 0.005 (1.63) LR = 0.014	0.02 (2.46)				0.05 (16.60)	0.054 (4.35)	
RHO		0.55 (3.30)	0.55 (2.90)	0.55 (3.30)	0.70 (4.31)			
$\overline{R2}$	0.83	0.87	0.86	0.33	0.86	0.93	0.72	0.77
DW	1.59	2.24	1.64	2.00	1.73	1.45	1.77	1.80
Share of 1981 Imports (%)	1.1	0.8	0.2	0.1	0.6	0.9	1.3	10.4
Market Share of Imports (1981, %)	19.4	6.6	19.1	12.1	14.3	14.0	85.4	49.5
Own Price Elasticity	-1.05	-1.15	-1.53	-3.58	-2.97	-1.60	-1.02	-1.29

	(25) GASOLINE	(26) FUEL OIL	(27) OTHER PETROLEUM AND COAL PRODUCTS	(28) SOAPS AND TOILET PREPARATIONS	(29) PAINTS AND RELATED PRODUCTS	(30) PHARMACEUTICALS	(31) CHEMICAL PRODUCTS	(32) FERTILIZER
Elasticity of Substitution		SR = -1.09 (-3.29) LR = -2.22		SR = -1.88 (-3.51) LR = -5.53			-0.7 (-1.38)	-1.2 (22.4)
Lagged Dependent Variable		0.51 (3.30)		0.66 (6.21)				
TIME								
RHO							0.8 (6.52)	0.7 (4.4)
$\overline{R2}$		0.92		0.91			0.74	0.73
DW		1.33		1.88			1.56	1.33
Share of 1981 Imports (%)	0.0	0.9	0.7	0.2	0.2	0.5	4.5	0.1
Market Share of Imports (1981, %)	0.4	8.5	14.7	9.2	12.6	26.8	32.2	26.5
Own Price Elasticity		-2.12	-	-5.11	-	-	c	-1.15

c) Undefined.

	(33) RUBBER AND PLASTIC PRODUCTS	(34) LEATHER AND LEATHER PRODUCTS	(35) FOOTWEAR	(36) YARNS OF MAN-MADE FIBRES	(37) FABRICS	(38) CARPETING	(39) TEXTILE	(40) CLOTHING
Elasticity of Substitution	-2.25 (-4.15)			-1.95 (-2.72)	-1.50 (-3.61)			-1.73 (-4.83)
Lagged Dependent Variable								
TIME				0.03 (4.63)	0.02 (3.77)			
DUMMY								-0.12* (-2.12)
RHO	0.7 (4.27)				0.4 (2.47)			
$\overline{R2}$	0.75			0.82	0.56			0.54
DW	1.35			1.94	1.91			1.85
Share of 1981 Imports (%)	1.3	0.3	0.5	0.7	1.3	0.2	0.5	1.6
Market Share of Imports (1981, %)	29.1	41.3	39.2	36.9	39.7	20.0	28.1	21.5
Own Price Elasticity	-1.89	-	-	-1.60	-1.30	-	-	-1.57

* This takes account of quotas on clothing imports: 1961-1976 = 0, 1977-1981 = 1.

	(41) PRINTING AND PUBLISHING	(42) FURNITURE	(43) RECREATIONAL AND MISC. CONS. GOODS	(44) CEMENT AND CONCRETE PRODUCTS	(45) GLASS PRODUCTS	(46) OTHER NON-METALLIC PRODUCTS	(47) IRON ORE CONCENTRATES	(48) OTHER ORES
Elasticity of Substitution	SR = -0.76 (-1.24) LR = -1.94	-3.24 (-4.27)		-4.84 (-2.46)	-0.93 (-1.74)	-0.97 (-10.1)	-4.54 (-1.11)	
Lagged Dependent Variable	0.61 (3.21)							
TIME		0.04 (4.1)		0.03 (2.53)		0.02 (7.01)		
RHO		0.6 (6.1)			0.8 (8.2)		0.65 (3.39)	
$\overline{R2}$	0.33	0.94		0.29	0.67	0.88	0.51	
DW	1.38	1.85		1.51	1.74	1.78	2.32	
Share of 1981 Imports (%)	1.2	0.5	2.3	0.08	0.5	0.8	0.4	2.4
Market Share of Imports (1981, %)	17.5	13.6	46.1	2.8	29.8	35.4	59.7	44.8
Own Price Elasticity	-1.78	-2.94	-	-4.73	c	c	-2.43	-

c) Undefined.

	(49) IRON, STEEL TUBES AND CASTINGS	(50) ALUMINUM PRODUCTS	(51) COPPER AND ALLOY PRODUCTS	(52) NON-FERROUS METAL PRODUCTS	(53) NON-METALLIC MINERALS	(54) FABRICATED STRUCTURAL METAL PRODUCTS	(55) WIRE PRODUCTS	(56) MACHINERY BOILERS TANKS AND PLATES
Elasticity of Substitution	-1.18 (-1.23)	-1.13 (-2.13)				-1.17 (-1.49)	-0.49 (-1.87)	-1.56 (-1.34)
Lagged Dependent Variable								
TIME	0.02 (3.46)						0.02 (5.42)	0.03 (5.16)
RHO		0.60 (4.75)				0.45 (2.58)		
$\overline{R2}$	0.47	0.78				0.39	0.66	0.56
DW	1.58	1.74				2.11	1.67	1.75
Share of 1981 Imports (%)	2.7	0.6	0.3	1.6	0.5	0.3	0.2	0.2
Market Share of Imports (1981, %)	24.6	22.6	18.5	67.8	46.2	9.8	19.3	14.4
Own Price Elasticity	-1.14	-1.10	-	-	-	-1.15	c	-1.48

c) Undefined.

	(57) HARDWARE AND TOOLS	(58) HEATING AND MISC. METAL PRODUCTS	(59) INDUSTRIAL MACHINERY AND EQUIPMENT	(60) TIRES AND TUBES	(61) AUTOS	(62) TRUCKS AND OTHER VEHICLES	(63) MOTOR VEHICLE PARTS AND ENGINES	(64) MISC. VEHICLE MANU-FACTURERS
Elasticity of Substitution		-0.92 (-2.36)	-0.59 (-1.11)	-9.07 (-3.20)			-2.62 (-3.37)	
Lagged Dependent Variable								
TIME			0.04 (4.32)	0.20 (5.57)				
RHO			0.75 (7.62)	0.45 (2.11)			0.35 (1.88)	
$\overline{R2}$		0.19	0.92	0.86			0.91	
DW		1.33	1.70	1.83			2.12	
Share of 1981 Imports (%)	2.1	1.4	15.4	0.5	6.7	2.5	11.4	0.2
Market Share of Imports (1981, %)	59.6	18.3	74.1	32.7	88.1	48.5	86.4	37.2
Own Price Elasticity	-	c	c	-6.43	-	-	-1.22	-

c) Undefined.

	(65) APPLIANCES	(66) RADIO AND TV	(67) COMMUNICATION EQUIPMENT	(68) ELECTRIC WIRE AND CABLE	(69) MISC. ELECTRICAL PRODUCTS	(70) SCIENTIFIC EQUIPMENT
Elasticity of Substitution	-2.25 (-2.43)	SR = -0.91 (-1.30) LR = -2.17	-2.51 (-2.78)	-0.91 (-2.59)		SR = -1.0 (-1.78) LR = -1.85
Lagged Dependent Variable		0.58 (2.73)				0.46 (2.46)
TIME	0.04 (7.56)	SR = 0.07 (1.88) LR = 0.08	0.05 (6.58)	0.06 (7.35)		SR = 0.025 (2.73) LR = 0.046
RHO			0.6 (6.67)	0.35 (1.91)		
$\overline{R2}$	0.84	0.96	0.91	0.85		0.93
DW	2.51	1.76	1.73	2.27		1.80
Share of 1981 Imports (%)	1.0	1.7	4.3	0.1	0.7	3.4
Market Share of Imports (1981, %)	38.1	82.6	48.0	8.8	29.6	74.6
Own Price Elasticity	-1.77	-1.10	-1.79	c	-	-1.22

c) Undefined.

Preliminary Estimation Results for the Nominal Share Model

	(1) GRAIN[c]	(2) LIVE ANIMALS	(3) OTHER AGRICULTURAL PRODUCTS	(4) FISHING HUNTING TRAPPING	(5) FISH PRODUCTS	(6) FEEDS	(7) TOBACCO	(8) CIGARETTES
Own Price Elasticity	-0.71 (-3.79)	-3.87 (-2.64)			-1.23 (-2.08)			
Lagged Dependent Variable								
TIME								
RHO		0.45 (2.14)						
$\overline{R2}$	0.46	0.59			0.15			
DW	1.48	1.66			1.90			
Share of 1981 Imports (%)	0.3	0.3	1.6	0.2	0.4	0.3	0.01	0.04
Market Share of Imports (1981, %)	10.4	3.6	20.4	20.5	56.5	6.8	3.6	3.0
Elasticity of Substitution	d	3.98	-	-	1.53	-	-	-

a) "T" statistics are in parentheses.
b) The estimation was done with OLS over the 1961-1981 period using annual data.
c) The activity variable for the grain commodity excludes inventory changes.
d) Undefined (price elasticity is less than one).

	(9) MEAT PRODUCTS	(10) DAIRY PRODUCTS	(11) FRUITS AND VEGETABLES	(12) FLOUR, WHEAT AND OTHER CEREALS	(13) BREAKFAST CEREALS AND BAKING PRODUCTS	(14) SUGAR	(15) SOFT DRINKS	(16) ALCOHOLIC BEVERAGES
Own Price Elasticity	-0.98 (4.21)	-1.81 (-2.20)			-0.86 (-2.57)	-0.34 (-1.15)		-1.10 (-4.30)
Lagged Dependent Variable								
TIME		0.02						
RHO		(1.74)				0.85 (8.0)		
$\overline{R2}$	0.55	0.50			0.90	0.35		0.47
DW	1.76	1.17			1.68	1.54		1.94
Share of 1981 Imports (%)	0.6	0.1	0.9	0.03	0.09	0.0	0.0	0.6
Market Share of Imports (1981, %)	4.8	2.3	27.8	4.6	3.3	0.9	1.7	21.1
Elasticity of Substitution	d	1.83	-	-	d	d	-	1.13

d) Undefined.

	(17) MISC FOOD PRODUCTS	(18) OTHER FORESTRY PRODUCTS	(19) VENEER AND PLYWOOD	(20) PULP	(21) NEWSPRINT AND OTHER PRODUCTS	(22) CONVERTED PAPERS	(23) COAL	(24) CRUDE OIL
Own Price Elasticity		-0.79 (-1.51)	-0.49 (-2.02)	-2.72 (-1.23)	-1.18 (-1.35)	-0.56 (-2.00)		
Lagged Dependent Variable								
TIME		-0.04 (-2.67)						
RHO			0.55 (2.88)	0.55 (3.27)	0.55 (2.78)			
$\overline{R2}$		0.83	0.52	0.25	0.80	0.10		
DW		1.89	1.74	1.99	1.85	2.15		
Share of 1981 Imports (%)	1.1	0.8	0.2	0.1	0.6	0.9	1.3	10.4
Market Share of Imports (1981, %)	19.4	6.6	19.1	12.1	14.3	14.0	85.4	49.5
Elasticity of Substitution	-	d	d	2.96	1.21	d	-	-

d) Undefined.

	(25) GASOLINE	(26) FUEL OIL	(27) OTHER PETROLEUM AND COAL PRODUCTS	(28) SOAPS AND TOILET PREPARA-TIONS	(29) PAINTS AND RELATED PRODUCTS	(30) PHARMA-CEUTICALS	(31) CHEMICAL PRODUCTS	(32) FERTI-LIZER
Own Price Elasticity				-1.57 (-1.75)			-1.44 (-2.89)	SR = -0.26 (-1.36) LR = -0.90
Lagged Dependent Variable								0.71 (4.59)
TIME								
RHO				0.55 (4.52)				
$\overline{R2}$				0.87			0.29	0.61
DW				1.74			0.85	1.41
Share of 1981 Imports (%)	0.0	0.9	0.7	0.2	0.2	0.5	4.5	0.1
Market Share of Imports (1981, %)	0.4	8.5	14.7	9.2	12.6	26.8	32.2	26.5
Elasticity of Substitution	-	-	-	1.63	-	-	1.65	d

d) Undefined.

	(33) RUBBER AND PLASTIC PRODUCTS	(34) LEATHER AND LEATHER PRODUCTS	(35) FOOTWEAR	(36) YARNS OF MAN-MADE FIBRES	(37) FABRICS	(38) CARPETING	(39) TEXTILE	(40) CLOTHING
Own Price Elasticity	-0.76 (-1.93)			SR = -0.86 (-2.32) LR = -1.76				
Lagged Dependent Variable				0.51 (2.83)				
TIME				SR = 0.01 (2.29) LR = 0.02				
RHO	0.65 (3.82)							
$\overline{R2}$	0.52			0.83				
DW	1.43			2.40				
Share of 1981 Imports (%)	1.3	0.3	0.5	0.7	1.3	0.2	0.5	1.6
Market Share of Imports (1981, %)	29.1	41.3	39.2	36.9	39.7	20.0	28.1	21.5
Elasticity of Substitution	d	-	-	2.20	-	-	-	-

d) Undefined.

	(41) PRINTING AND PUBLISHING	(42) FURNITURE	(43) RECREATIONAL AND MISC. CONS. GOODS	(44) CEMENT AND CONCRETE PRODUCTS	(45) GLASS PRODUCTS	(46) OTHER NON-METALLIC PRODUCTS	(47) IRON ORE CONCENTRATES	(48) OTHER ORES
Own Price Elasticity		-2.00 (-2.99)		-3.52 (-2.49)			-6.34 (-4.32)	
Lagged Dependent Variable								
TIME								
RHO		0.50 (3.43)						
$\overline{R2}$		0.91		0.57			0.48	
DW		1.69		1.91			1.45	
Share of 1981 Imports (%)	1.2	0.5	2.3	0.08	0.5	0.8	0.4	2.4
Market Share of Imports (1981, %)	17.5	13.6	46.1	2.8	29.8	35.4	59.7	44.8
Elasticity of Substitution	-	2.16	-	3.59	-	-	14.25	-

d) Undefined.

	(49) IRON, STEEL TUBES AND CASTINGS	(50) ALUMINUM PRODUCTS	(51) COPPER AND ALLOY PRODUCTS	(52) NON-FERROUS METAL PRODUCTS	(53) NON-METALLIC MINERALS	(54) FABRICATED STRUCTURAL METAL PRODUCTS	(55) WIRE PRODUCTS	(56) MACHINERY BOILERS TANKS AND PLATES
Own Price Elasticity	-1.94 (-1.91)	-0.77 (-4.53)	-7.27 (3.53)					-1.22 (-1.11)
Lagged Dependent Variable								
TIME								
RHO								
$\overline{R2}$	0.13	0.49	0.39					0.55
DW	1.56	0.92	0.95					1.63
Share of 1981 Imports (%)	2.7	0.6	0.3	1.6	0.5	0.3	0.2	0.2
Market Share of Imports (1981, %)	24.6	22.6	18.5	67.8	46.2	9.8	19.3	14.4
Elasticity of Substitution	2.25	d	8.69	-	-	-	-	1.26

d) Undefined.

	(57) HARDWARE AND TOOLS	(58) HEATING AND MISC. METAL PRODUCTS	(59) INDUSTRIAL MACHINERY AND EQUIPMENT	(60) TIRES AND TUBES	(61) AUTOS	(62) TRUCKS AND OTHER VEHICLES	(63) MOTOR VEHICLE PARTS AND ENGINES	(64) MISC. VEHICLE MANU-FACTURERS
Own Price Elasticity		-1.16 (-3.08)		-7.27 (-3.56)			-1.06 (-6.42)	
Lagged Dependent Variable								
TIME		0.01 (3.53)					0.05 (14.26)	
RHO								
$\overline{R2}$		0.38		0.89			0.96	
DW		1.77		1.41			1.89	
Share of 1981 Imports (%)	2.1	1.4	15.4	0.5	6.7	2.5	11.4	0.2
Market Share of Imports (1981, %)	59.6	18.3	74.1	32.7	88.1	48.5	86.4	37.2
Elasticity of Substitution	-	1.20	-	10.32	-	-	1.44	-

	(65) APPLIANCES	(66) RADIO AND TV	(67) COMMUNICATION EQUIPMENT	(68) ELECTRIC WIRE AND CABLE	(69) MISC. ELECTRICAL PRODUCTS	(70) SCIENTIFIC EQUIPMENT
Own Price Elasticity		-1.27 (-2.93)	-0.69 (-1.19)			
Lagged Dependent Variable						
TIME						
RHO			0.55 (3.24)			
$\overline{R2}$		0.93	0.87			
DW		1.95	1.44			
Share of 1981 Imports (%)	1.0	1.7	4.3	0.1	0.7	3.4
Market Share of Imports (1981, %)	38.1	82.6	48.0	8.8	29.6	74.6
Elasticity of Substitution	-	2.55	d	-	-	-

d) Undefined.

Preliminary Estimation Results for the Conventional Import Demand Function

	(1) GRAIN[c]	(2) LIVE ANIMALS	(3) OTHER AGRICULTURAL PRODUCTS	(4) FISHING HUNTING TRAPPING	(5) FISH PRODUCTS	(6) FEEDS	(7) TOBACCO	(8) CIGARETTES
Relative Prices	-1.34 (-6.00)	-4.85 (-3.52)	-0.70 (-3.05)		-2.22 (-3.58)		-0.67 (-2.36)	-0.52 (-3.00)
Lagged Dependent Variable								
TIME		-0.05 (-2.42)						0.04 (6.56)
RHO	0.45	0.45 (2.31)	0.45 (1.93)					
$\overline{R2}$	0.64	0.69	0.38		0.38		0.19	0.89
DW	1.42	1.73	2.00		1.91		2.04	1.69
Share of 1981 Imports (%)	0.3	0.3	1.6	0.2	0.4	0.3	0.01	0.04
Market Share of Imports (1981, %)	10.4	3.6	20.4	20.5	56.5	6.8	3.6	3.0
Elasticity of Substitution	1.38	4.99	d	-	3.80	-	d	d

a) "T" statistics are in parentheses.
b) The estimation was done with OLS over the 1961-1981 period using annual data.
c) The activity variable for the grain commodity excludes inventory changes.
d) Undefined (relative price elasticity is less than one).

	(9) MEAT PRODUCTS	(10) DAIRY PRODUCTS	(11) FRUITS AND VEGETABLES	(12) FLOUR, WHEAT AND OTHER CEREALS	(13) BREAKFAST CEREALS AND BAKING PRODUCTS	(14) SUGAR	(15) SOFT DRINKS	(16) ALCOHOLIC BEVERAGES
Relative Prices	-1.87 (-7.60)	-1.67 (-2.09)	SR = -0.38 (-4.39) LR = -1.80	-0.45 (-0.88)	SR = -0.83 (-2.75) LR = -1.11	-1.20 (-2.75)		-2.95 (-7.98)
Lagged Dependent Variable			0.79 (11.57)		0.25 (1.88)			
TIME	0.01 (2.11)	0.03 (1.56)			SR = 0.03 (4.80) LR = 0.04			
RHO		0.55 (2.80)		0.75 (6.04)				
$\overline{R2}$	0.80	0.76	0.95	0.61	0.95	0.29		0.76
DW	1.72	1.58	2.45	2.03	1.67	1.0		1.78
Share of 1981 Imports (%)	0.6	0.1	0.9	0.03	0.09	0.0	0.0	0.6
Market Share of Imports (1981, %)	4.8	2.3	27.8	4.6	3.3	0.9	1.7	21.1
Elasticity of Substitution	1.91	1.69	2.11	d	1.11	1.21	-	3.47

d) Undefined.

	(17) MISC FOOD PRODUCTS	(18) OTHER FORESTRY PRODUCTS	(19) VENEER AND PLYWOOD	(20) PULP	(21) NEWSPRINT AND OTHER PRODUCTS	(22) CONVERTED PAPERS	(23) COAL	(24) CRUDE OIL
Relative Prices	SR = -0.33 (-2.15) LR = -0.92	-1.11 (-1.89)	-1.44 (-6.49)	-3.55 (-1.75)	-3.00 (-3.82)	-1.57 (-6.10)	-0.18 (-2.90)	SR = -0.28 (-3.34) LR = -0.93
Lagged Dependent Variable	0.64 (3.93)							0.71 (5.30)
TIME	SR = 0.004 (1.60) LR = 0.01	0.02 (2.45)				0.04 (16.39)	0.01 (4.74)	
RHO		0.55 (3.30)	0.55 (2.84)	0.55 (3.31)	0.70 (4.34)			
$\overline{R2}$	0.83	0.87	0.87	0.33	0.86	0.93	0.73	0.78
DW	1.60	2.24	1.75	1.97	1.76	1.47	1.58	1.78
Share of 1981 Imports (%)	1.1	0.8	0.2	0.1	0.6	0.9	1.3	10.4
Market Share of Imports (1981, %)	19.4	6.6	19.1	12.1	14.3	14.0	85.4	49.5
Elasticity of Substitution	d	1.12	1.54	3.90	3.33	1.66	d	d

d) Undefined.

	(25) GASOLINE	(26) FUEL OIL	(27) OTHER PETROLEUM AND COAL PRODUCTS	(28) SOAPS AND TOILET PREPARATIONS	(29) PAINTS AND RELATED PRODUCTS	(30) PHARMACEUTICALS	(31) CHEMICAL PRODUCTS	(32) FERTILIZER
Relative Prices		SR = -1.05 (-3.58) LR = -2.02	SR = -0.03 (-0.11) LR = -0.05	SR = -1.79 (-3.57) LR = -5.26	-1.29 (-1.20)	SR = -0.65 (-0.84) LR = -3.82	-0.50 (-1.52)	-1.02 (-3.04)
Lagged Dependent Variable		0.48 (3.16)	0.44 (1.98)	0.66 (6.21)		0.83 (6.21)		
TIME			SR = -0.02 (-2.12) LR = -0.04					
RHO							0.80 (6.55)	0.70 (4.35)
$\overline{R2}$		0.92	0.79	0.91	0.02	0.68	0.74	0.78
DW		1.40	1.73	1.91	2.35	2.29	1.60	1.38
Share of 1981 Imports (%)	0.0	0.9	0.7	0.2	0.2	0.5	4.5	0.1
Market Share of Imports (1981, %)	0.4	8.5	14.7	9.2	12.6	26.8	32.2	26.5
Elasticity of Substitution	-	2.11	d	5.69	1.33	4.85	d	1.03

d) Undefined.

	(33) RUBBER AND PLASTIC PRODUCTS	(34) LEATHER AND LEATHER PRODUCTS	(35) FOOTWEAR	(36) YARNS OF MAN-MADE FIBRES	(37) FABRICS	(38) CARPETING	(39) TEXTILE	(40) CLOTHING
Relative Prices	-1.6/ (-4.18)			-1.38 (-2.75)	-0.99 (-3.64)	-0.39 (-0.94)		-1.54 (-4.98)
Lagged Dependent Variable								
TIME				0.02 (4.31)	0.017 (3.88)	0.014 (1.34)		
DUMMY								-0.10* (-2.13)
RHO	0.70 (4.28)			0.50 (2.51)	0.40 (2.50)			
$\overline{R2}$	0.76			0.83	0.58	0.44		0.56
DW	1.36			2.00	1.90	1.58		1.78
Share of 1981 Imports (%)	1.3	0.3	0.5	0.7	1.3	0.2	0.5	1.6
Market Share of Imports (1981, %)	29.1	41.3	39.2	36.9	39.7	20.0	28.1	21.5
Elasticity of Substitution	1.94	d	-	1.60	d	-	-	1.69

d) Undefined.
* This takes account of quotas on clothing imports: 1961-1976 = 0, 1977-1981 = 1.

	(41) PRINTING AND PUBLISHING	(42) FURNITURE	(43) RECREATIONAL AND MISC. CONS. GOODS	(44) CEMENT AND CONCRETE PRODUCTS	(45) GLASS PRODUCTS	(46) OTHER NON-METALLIC PRODUCTS	(47) IRON ORE CONCENTRATES	(48) OTHER ORES
Relative Prices	SR = -0.61 (-1.25) LR = -1.60	-2.94 (-4.21)		-4.81 (-2.48)	-0.67 (-1.75)	-0.71 (-10.46)	-5.58 (-2.18)	SR = -0.11 (-0.47) LR = -0.23
Lagged Dependent Variable	0.62 (3.26)							0.52 (2.60)
TIME		0.04 (4.04)		0.03 (2.53)		0.01 (7.49)		SR = 0.02 (2.05) LR = 0.04
RHO		0.60 (6.01)			0.80 (8.03)		0.40 (1.72)	
$\overline{R2}$	0.34	0.94		0.29	0.67	0.89	0.47	0.49
DW	1.37	1.88		1.51	1.76	1.75	2.05	2.00
Share of 1981 Imports (%)	1.2	0.5	2.3	0.08	0.5	0.8	0.4	2.4
Market Share of Imports (1981, %)	17.5	13.6	46.1	2.8	29.8	35.4	59.7	44.8
Elasticity of Substitution	1.73	3.25	-	4.92	d	d	12.36	d

d) Undefined.

	(49) IRON, STEEL TUBES AND CASTINGS	(50) ALUMINUM PRODUCTS	(51) COPPER AND ALLOY PRODUCTS	(52) NON-FERROUS METAL PRODUCTS	(53) NON-METALLIC MINERALS	(54) FABRICATED STRUCTURAL METAL PRODUCTS	(55) WIRE PRODUCTS	(56) MACHINERY BOILERS TANKS AND PLATES
Relative Prices	-1.02 (-1.28)	-0.97 (-2.25)			SR = -0.13 (-0.38) LR = -0.27	-1.07 (-1.49)	-0.43 (-1.90)	-1.42 (-1.35)
Lagged Dependent Variable					0.52 (2.46)			
TIME	0.02 (3.55)						0.016 (5.47)	0.027 (5.17)
RHO		0.60 (5.17)				0.45 (2.57)		
$\overline{R2}$	0.48	0.80			0.21	0.39	0.67	0.56
DW	1.56	1.73			1.62	2.12	1.67	1.75
Share of 1981 Imports (%)	2.7	0.6	0.3	1.6	0.5	0.3	0.2	0.2
Market Share of Imports (1981, %)	24.6	22.6	18.5	67.8	46.2	9.8	19.3	14.4
Elasticity of Substitution	1.03	d	-	-	d	1.08	d	1.49

d) Undefined.

	(57) HARDWARE AND TOOLS	(58) HEATING AND MISC. METAL PRODUCTS	(59) INDUSTRIAL MACHINERY AND EQUIPMENT	(60) TIRES AND TUBES	(61) AUTOS	(62) TRUCKS AND OTHER VEHICLES	(63) MOTOR VEHICLE PARTS AND ENGINES	(64) MISC. VEHICLE MANU-FACTURERS
Relative Prices		-1.05 (-2.53)		-6.83 (-3.01)			-0.90 (-3.58)	
Lagged Dependent Variable								
TIME		0.003 (1.14)		0.16 (5.38)			0.04 (7.03)	
RHO				0.50 (2.37)			0.40 (2.26)	
$\overline{R2}$		0.19		0.87			0.92	
DW		1.45		1.93			2.25	
Share of 1981 Imports (%)	2.1	1.4	15.4	0.5	6.7	2.5	11.4	0.2
Market Share of Imports (1981, %)	59.6	18.3	74.1	32.7	88.1	48.5	86.4	37.2
Elasticity of Substitution	-	1.06	-	9.66	-	-	d	-

	(65) APPLIANCES	(66) RADIO AND TV	(67) COMMUNICATION EQUIPMENT	(68) ELECTRIC WIRE AND CABLE	(69) MISC. ELECTRICAL PRODUCTS	(70) SCIENTIFIC EQUIPMENT
Relative Prices	-1.52 (-2.33)	SR = -0.91 (-1.99) LR = -1.52	-1.54 (-2.69)	-0.88 (-2.63)		SR = -0.34 (-1.76) LR = -0.71
Lagged Dependent Variable		0.41 (1.86)				0.56 (3.50)
TIME	0.03 (7.69)	SR = 0.05 (2.41) LR = 0.08	0.03 (6.54)	0.05 (7.32)		SR = 0.008 (2.47) LR = 0.018
RHO	0.30 (2.51)		0.60 (6.19)	0.35 (1.91)		
$\overline{R2}$	0.84	0.94	0.82	0.85		0.94
DW	2.46	1.98	1.74	2.25		1.83
Share of 1981 Imports (%)	1.0	1.7	4.3	0.1	0.7	3.4
Market Share of Imports (1981, %)	38.1	82.6	48.0	8.8	29.6	74.6
Elasticity of Substitution	1.84	3.99	2.04	d	-	d

d) Undefined.

Preliminary Estimation Results for the Buckler-Almon Model

	(1) GRAIN	(2) LIVE ANIMALS	(3) OTHER AGRICULTURAL PRODUCTS	(4) FISHING HUNTING TRAPPING	(5) FISH PRODUCTS	(6) FEEDS	(7) TOBACCO	(8) CIGARETTES
Own Price Elasticity	-0.52[d] (-1.80)	-5.48 (-2.50)					-1.17[d] (-1.41)	-0.56 (-1.82)
$\overline{R2}$	0.90	0.90					0.78	0.99
DW	1.59	1.28					2.40	1.89
Share of 1981 Imports (%)	0.3	0.3	1.6	0.2	0.4	0.3	0.01	0.04
Market Share of Imports (1981, %)	10.4	3.6	20.4	20.5	56.5	6.8	3.6	3.0
Elasticity of Substitution	c	5.65	c				1.18	c

a) "T" statistics are in parentheses.
b) The estimation was done with OLS over the 1963-1981 period using annual data.
c) Undefined (own price elasticity is less than one).
d) Using the following lag pattern: P = 0.25pt + 0.65 Pt-1 + 0.10 Pt-2

	(9) MEAT PRODUCTS	(10) DAIRY PRODUCTS	(11) FRUITS AND VEGETABLES	(12) FLOUR, WHEAT AND OTHER CEREALS	(13) BREAKFAST CEREALS AND BAKING PRODUCTS	(14) SUGAR	(15) SOFT DRINKS	(16) ALCOHOLIC BEVERAGES
Own Price Elasticity	-1.66 (6.49)	-3.60 (-3.07)	-0.25[d] (-2.07)	-0.71[d] (-3.14)		-0.91 (-7.85)	-2.13[d] (-0.89)	-1.17 (-3.14)
$\overline{R2}$	0.98	0.94	0.99	0.96		0.89	0.90	0.98
DW	2.00	1.16	1.35	0.54		1.04	1.47	1.48
Share of 1981 Imports (%)	0.6	0.1	0.9	0.03	0.09	0	0	0.6
Market Share of Imports (1981, %)	4.8	2.3	27.8	4.6	3.3	0.9	1.7	21.1
Elasticity of Substitution	1.69	3.66	c	c	-	c	2.15	1.22

c) Undefined.
d) lag pattern $Pt = 0.25Pt + 0.65\ Pt-1 + 0.10\ Pt-2$

	(17) MISC FOOD PRODUCTS	(18) OTHER FORESTRY PRODUCTS	(19) VENEER AND PLYWOOD	(20) PULP	(21) NEWSPRINT AND OTHER PRODUCTS	(22) CONVERTED PAPERS	(23) COAL	(24) CRUDE OIL
Own Price Elasticity	-0.60[d] (-2.84)		-2.05 (-3.35)	-5.84 (-1.82)	-2.94 (-2.50)		-0.36 (-4.48)	
$\overline{R2}$	0.99		0.94	0.90	0.96		0.99	
DW	1.25		0.98	0.99	0.79		0.98	
Share of 1981 Imports (%)	1.1	0.8	0.2	0.1	0.6	0.9	1.3	10.4
Market Share of Imports (1981, %)	19.4	6.6	19.1	12.1	14.3	14.0	85.4	49.5
Elasticity ot Substitution	c	-	2.30	6.51	3.29	-	c	-

c) Undefined
d) lag pattern $Pt = 0.25Pt + 0.65\ Pt-1 + 0.10\ Pt-2$

	(25) GASOLINE	(26) FUEL OIL	(27) OTHER PETROLEUM AND COAL PRODUCTS	(28) SOAPS AND TOILET PREPARATIONS	(29) PAINTS AND RELATED PRODUCTS	(30) PHARMACEUTICALS	(31) CHEMICAL PRODUCTS	(32) FERTILIZER
Own Price Elasticity								-1.75 (-2.24)
$\overline{R2}$								0.84
DW								0.66
Share of 1981 Imports (%)	0.0	0.9	0.7	0.2	0.2	0.5	4.5	0.1
Market Share of Imports (1981, %)	0.4	8.5	14.7	9.2	12.6	26.8	32.2	26.5
Elasticity of Substitution	-	-	-	-	-	-	-	2.02

	(33) RUBBER AND PLASTIC PRODUCTS	(34) LEATHER AND LEATHER PRODUCTS	(35) FOOTWEAR	(36) YARNS OF MAN-MADE FIBRES	(37) FABRICS	(38) CARPETING	(39) TEXTILE	(40) CLOTHING
Own Price Elasticity	-1.48 (-2.91)	-2.98[d] (-2.93)		-1.22 (-1.97)	-0.74 (-3.98)			
$\overline{R2}$	0.99	0.99		0.99	0.99			
DW	0.95	1.58		1.45	1.12			
Share of 1981 Imports (%)	1.3	0.3	0.5	0.7	1.3	0.2	0.5	1.6
Market Share of Imports (1981, %)	29.1	41.3	39.2	36.9	39.7	20.0	28.1	21.5
Elasticity of Substitution	1.68	4.37	-	1.35	c	-	-	-

c) Undefined
d) lag pattern: $P = 0.25\ Pt + 0.65\ Pt-1 + 0.10\ Pt-2$

	(41) PRINTING AND PUBLISHING	(42) FURNITURE	(43) RECREATIONAL AND MISC. CONS. GOODS	(44) CEMENT AND CONCRETE PRODUCTS	(45) GLASS PRODUCTS	(46) OTHER NON-METALLIC PRODUCTS	(47) IRON ORE CONCENTRATES	(48) OTHER ORES
Own Price Elasticity		-2.89[d] (-4.73)				-0.59 (-5.72)	-7.21[d] (-4.20)	
$\overline{R2}$		0.99				0.99	0.92	
DW		0.87				1.79	1.22	
Share of 1981 Imports (%)	1.2	0.5	2.3	0.08	0.5	0.8	0.4	2.4
Market Share of Imports (1981, %)	17.5	13.6	46.1	2.8	29.8	35.4	59.7	44.8
Elasticity of Substitution	-	3.19	-	-	-	c	16.41	-

c) Undefined.
d) lag pattern $P = 0.25\ Pt + 0.65\ Pt-1 + 0.10\ Pt-2$

	(49) IRON, STEEL TUBES AND CASTINGS	(50) ALUMINUM PRODUCTS	(51) COPPER AND ALLOY PRODUCTS	(52) NON-FERROUS METAL PRODUCTS	(53) NON-METALLIC MINERALS	(54) FABRICATED STRUCTURAL METAL PRODUCTS	(55) WIRE PRODUCTS	(56) MACHINERY BOILERS TANKS AND PLATES
Own Price Elasticity		-1.04 (-2.32)			-0.59[d] (-0.91)	-1.66[d] (-2.37)		
$\overline{R2}$		0.97			0.99	0.97		
DW		1.16			1.07	1.43		
Share of 1981 Imports (%)	2.7	0.6	0.3	1.6	0.5	0.3	0.2	0.2
Market Share of Imports (1981, %)	24.6	22.6	18.5	67.8	46.2	9.8	19.3	14.4
Elasticity of Substitution	-	1.05	-	-	c	1.73	-	-

c) Undefined.
d) Lag pattern P = 0.25 Pt + 0.65 Pt-1 + 0.10 Pt-2

	(57) HARDWARE AND TOOLS	(58) HEATING AND MISC. METAL PRODUCTS	(59) INDUSTRIAL MACHINERY AND EQUIPMENT	(60) TIRES AND TUBES	(61) AUTOS	(62) TRUCKS AND OTHER VEHICLES	(63) MOTOR VEHICLE PARTS AND ENGINES	(64) MISC. VEHICLE MANU-FACTURERS
Own Price Elasticity		-2.14 (-4.84)		-2.68 (-2.96)				
$\overline{R2}$		0.99		0.95				
DW		1.88		1.08				
Share of 1981 Imports (%)	2.1	1.4	15.4	0.5	6.7	2.5	11.4	0.2
Market Share of Imports (1981, %)	59.6	18.3	74.1	32.7	88.1	48.5	86.4	37.2
Elasticity of Substitution	-	2.40	-	3.50	-	-	-	-

c) Undefined.

	(65) APPLIANCES	(66) RADIO AND TV	(67) COMMUNICATION EQUIPMENT	(68) ELECTRIC WIRE AND CABLE	(69) MISC. ELECTRICAL PRODUCTS	(70) SCIENTIFIC EQUIPMENT
Own Price Elasticity	-0.7/[d] (-0.84)					-0.49 (-1.65)
$\overline{R2}$	0.99					0.99
DW	1.05					0.58
Share of 1981 Imports (%)	1.0	1.7	4.3	0.1	0.7	3.4
Market Share of Imports (1981, %)	38.1	82.6	48.0	8.8	29.6	74.6
Elasticity of Substitution	c	-	-	-	-	c

c) Undefined.

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